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Note on the Discovery of the Graphical Method for Solving Kepler's Equation by means of a Curve of Sines. By T. J. J. See, A.M., Ph.D. (Berlin).

Through the courtesy of the Secretary, Dr. K. Zelbr, of Brünn, recently of the Imperial Observatory of Vienna, has called my attention to the fact that the method for solving Kepler's Equation by means of a curve of sines, given in the *Monthly Notices* for June, and usually attributed to Dubois, of Brest, was in reality discovered by an Englishman, J. J. Waterston, Esq. A short abstract of his paper appears in the *Monthly Notices* for 1849–50, p. 169, and is entitled, "On a Graphical Mode of Computing the Eccentric Anomaly." Dr. Zelbr writes that this error in regard to the original discoverer occurs in several standard astronomical works, notably in Wolf's *Handbuch der Astronomie*, and Klinkerfues' *Theoretische Astronomie*, from which it seems fairly certain that Waterston's discovery of this important method has been generally overlooked.

Klinkerfues' discussion first directed my attention to the method, and as Dubōis in *Astron. Nachr.* 1404 makes no mention of any previous discovery, I assumed with Klinkerfues that Dubois had been the first to detect the possibility of such a solution. It is clear, however, from the concise abstract printed in the *Monthly Notices* for 1849–50, that Waterston had preceded Dubois by about fourteen years; and while Dubois' discovery seems to have been independent of Waterston's, the latter has the undoubted right of priority.

I cannot but remark how singular it is that a method of such great practical importance should rest in comparative oblivion during half a century at a time when astronomers were constantly working on the motions of periodic comets and double stars; but it is probable that neither Waterston nor Dubois recognised the great generality and high value of the method in practical work. Since writing the paper which I communicated to the Society at the June meeting I have had occasion to make great use of the method in revising the orbits of double stars, and have found it, not only the easiest and most rapid process yet invented, but one altogether so satisfactory that we may predict its universal adoption by astronomers. The simplicity and generality of the method and the rapidity and accuracy with which solutions can be obtained invite the inference that in the nature of the case the method is probably ultimate, and is not likely to be improved upon in any future age.

The true history of an important discovery is always interesting, and while Waterston's work does not diminish the credit

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due to Dubois for an independent result, it will yet be gratifying to the present Fellows of the Society to know that the original discovery was made by a countryman and a contemporary of Sir John Herschel.

The University of Chicago:
1895 *October* 22.

Micrometrical Determinations of the Diameters of the Minor Planets Ceres (1), *Pallas* (2), *Juno* (3), *and Vesta* (4), *made with the Filar Micrometer of the* 36-*inch Equatorial of the Lick Observatory, and on the Albedos of those Planets.* By E. E. Barnard.

In *Monthly Notices of the Royal Astronomical Society*, vol. liv. No. 9, I have given a series of micrometer measures of the diameters of the asteroids *Ceres* (1), *Pallas* (2), and *Vesta* (4) made with the great telescope.

These measures have been continued this year, except in the case of *Pallas*, whose greatly increased distance discouraged any measures of it.

I have also secured measures of *Juno* on four nights. The disc of this object, however, was extremely small, and so nearly the size of the spurious disc of a star of the same magnitude that it must for the present, perhaps, be taken as showing only the possible maximum diameter.

I am confident, however, that the real disc was seen, as it seemed to sensibly enlarge with the higher powers.

On each night, while under observation, this asteroid was micrometrically referred to some star near it for motion, so that no mistake was possible in its identification.

Ceres has been running very far south—some 28° of south declination. This has made it rather difficult; but no measures were attempted unless the disc was clearly seen.

The measures were made with 1,000 diameters, except in one or two instances, when 1,500 was used. On one or two occasions 2,600 was also employed. But 1,000 was found more uniformly satisfactory.

For completeness of this paper I have added to these measures my observations of 1894 (including those of *Pallas*).

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